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DAILY NECESSARIES

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[Attached amendments have been incorporated into text of translation.]

Abstract

Task

To offer daily necessaries that can help in easy, convenient, and early detection of human and animal diseases.

Means to solve

The characteristics include: being equipped with 1 or more pieces of paper and polymer-containing sheets, which are held between a non-woven fabric and a synthetic resin film, and the aforementioned paper and polymer-containing sheets being printed with (1) a glucose-detecting ink composite of a reagent composite, consisting of a sugar-oxidizing enzyme, a peroxidase, and an oxidation indicator, which is dissolved or dispersed in a non-water-soluble solvent; (2) a protein-detecting ink composite

of a reagent composite, consisting of an indicator which indicates protein, a pH buffer, a protein-absorbing ion exchanger, a binder, and a water-absorbing powder, which is dissolved or dispersed in a solvent, and (3) a urobilinogen-detecting ink composite, consisting of a pigment precursor which reacts with urobilinogen and displays color, a strong acid buffer, a binder, and a water-absorbing powder, which is dissolved or dispersed in a non-water-soluble solvent, for example.

Claim

1. Daily necessaries characterized by being equipped with a non-woven fabric which has the characteristic of allowing fluids to pass through, a synthetic resin film which has the characteristic of not allowing fluids to pass through, and 1 or more pieces of paper and polymer-containing sheets, which are held between the aforementioned non-woven fabric and the synthetic resin film, and the aforementioned paper and polymer containing sheets being printed with (1) a glucose-detecting ink composite of a reagent composite, consisting of a sugar-oxidizing enzyme, a peroxidase, an oxidation indicator, binder, and a stabilizer, which is dissolved or dispersed in a non-water-soluble solvent; (2) a protein-detecting ink composite of a reagent composite, consisting of an indicator which indicates protein, a pH buffer, a protein-absorbing ion exchanger, a binder, and a water-absorbing powder, which is dissolved or dispersed in a solvent, (3) a pH-detecting ink composite, consisting of a pH indicator, a quaternary ammonium salt or amine salt, a binder, and a water-absorbing powder,

which is dissolved or dispersed in a solvent, (4) an occult blood detecting ink composite, consisting of an oxidation indicator, an organic peroxide, a binder, and a surface-active agent and a background pigment if necessary, which is dissolved or dispersed in a non-water soluble solvent, or (5) a urobilinogen-detecting ink composite, consisting of a pigment precursor which reacts with urobilinogen and displays color, a strong acid buffer, a binder, and a water-absorbing powder, which is dissolved or dispersed in a non-water-soluble solvent, or with 2 or more of the ink composites from the aforementioned ink composites in a manner that avoids their overlapping.

Detailed explanation of the invention

[0001]

Industrial application field

This invention concerns daily necessaries including litter sand for pets, tissue paper, diapers, and toilet paper that are used by human and animals for easy and rapid detection of glucose, protein, occult blood, urobilinogen, and pH in the urine.

[0002]

Prior art

Easy and rapid detection of the presence as well as the amount of each primary component contained in the urine is

extremely important when detecting, diagnosing, and treating disease. For example, a rapid and easy detection of the amount of glucose in the urine is a must in the early detection, diagnosis, treatment as well as control of diabetes. Also, a rapid and easy detection of the amount of protein in urine has a big role in the early detection, diagnosis, and treatment of kidney problems. Furthermore, a detection of the amount of urobilinogen in urine has a big role in diagnosing the performance of the liver.

[0003]

Problem to be solved by this invention

As mentioned above, the easy and rapid detection of glucose, protein, occult blood, urobilinogen, and pH in the urine is very important. However, the conventional test piece for the detection of glucose, in urine, in which filter paper impregnated with a test reagent is laminated onto a support, has the disadvantage of not being very useful in the easy, convenient, and early detection of human and animal diseases because it is not something that is used everyday. Therefore, the aim of this invention is to offer daily necessaries including litter for pets, tissue paper, diapers, and toilet paper that can help in easy, convenient and rapid detection of human and animal diseases.

[0005]

Means to solve the problem

This invention is for daily necessaries that are characterized by being equipped with a non-woven fabric which has the characteristic of allowing fluids to pass through, a synthetic resin film which has the characteristic of not allowing fluids to pass through, and 1 or more paper and polymer-containing sheets, which are held between the aforementioned non-woven fabric and the synthetic resin film, and the aforementioned paper and polymer-containing sheets being printed with (1) a glucose-detecting ink composite of a reagent composite, consisting of a sugar-oxidizing enzyme, a peroxidase, an oxidation indicator, binder, and a stabilizer, which is dissolved or dispersed in a non-water-soluble solvent; (2) a protein-detecting ink composite of a reagent composite, consisting of an indicator which indicates protein, a pH buffer, a protein-absorbing ion exchanger, binder, and a water-absorbing powder, which is dissolved or dispersed in a solvent, (3) a pH-detecting ink composite, consisting of a pH indicator, a quaternary ammonium salt or amine salt, a binder, and a water-absorbing powder, which is dissolved or dispersed in a solvent, (4) an occult blood detecting ink composite, consisting of an oxidation indicator, an organic peroxide, a binder, and a surface-active agent and a background pigment if necessary, which is dissolved or dispersed in a non-water-soluble solvent, or (5) a urobilinogen-detecting ink composite, consisting of a pigment precursor which reacts with urobilinogen and displays color, a strong acid buffer, a binder, and a water-absorbing

powder, which is dissolved or dispersed in a non-water-soluble solvent, or with 2 or more of the ink composites from the aforementioned ink composites in a manner so that they do not overlap.

[0007]

Function

Because this invention consists of materials that are printed, coated, or impregnated with the necessary ink composites, easy, convenient, and early detection of human and animal diseases is possible through the discoloration reaction of the human or animal body fluid, such as urine, for example, with these ink composites.

[0008]

Application examples

This invention will be explained based on the application examples while referring to the figures below. Figure 1 is an oblique diagram of a daily necessary in Application Example 1 of this invention. The sheet in this application example has the characteristic of allowing fluids to pass through, and it consists of: a non-woven fabric (1) as the first sheet consisting of rayon, for example, which allows human or animal wastes to pass through, such as urine, for example; a synthetic resin film (4) as the second sheet having the characteristic of not allowing fluids to pass through; and paper (2) and a

polymer-containing sheet (3) as the third sheet, which is held between the non-woven fabric (1) and the synthetic resin film (4).

[0009]

Furthermore, an ink composite is impregnated, coated, or printed onto any one or more sheets of the non-woven fabric (1), paper (2), and the polymer containing sheet (3). This third sheet may be constructed of 1 or more pieces of paper and non-woven fabric, and the number is not particularly restricted. Also, the material of the first through third sheets certainly is not limited to the aforementioned paper, polymer containing sheet, and film, for example.

[0010]

This application example consists of a material, in which 1 or more of the glucose-detecting ink composite, protein-detecting ink composite, pH-detecting ink composite, occult [blood] detecting ink composite, and urobilinogen-detecting ink composite are printed, coated, or impregnated. The ink composites will be described in detail below. First, in the glucose-detecting ink composite, a reagent composite, consisting of a sugar-oxidizing enzyme, a peroxidase, an oxidation indicator, a binder, and a stabilizer, is dissolved or dispersed in a non-water-soluble solvent.

[0011]

The glucose in the body fluid reacts with the oxygen in the air through the interaction of the glucose-oxidizing enzyme, such as glucose oxidase, for example, and is eventually oxidized into gluconic acid and hydrogen peroxide. The hydrogen peroxide that is formed generates nascent oxygen through the interaction of the peroxidase, this oxygen immediately reacts with the oxidation indicator, such as orthotolidine, for example, and displays the color of this indicator. The presence of glucose as well as its amount in the body fluid is semiquantitatively determined by the level of that coloration. The degree of coloring can be improved by using glucose oxidase, which is a sugar-oxidizing enzyme, peroxidase, an oxidation indicator, such as orthotolidine, for example, and aliphatic carboxylic acid ester of ascorbic acid, which is a sensitivity regulator.

[0012]

As the binder, (1) synthetic resins including a polyester resin, alkyd resin, polyurethane resin, polystyrene resin, and an acryl resin, for example, (2) cellulose derivatives including methylcellulose, ethylcellulose, hydroxyethylcellulose, and carboxymethylcellulose, for example, (3) natural high polymers including starches, polysaccharides, gelatin, casein, and sodium alginate, for example, and a combination of (1)-(3) can be used.

[0013]

As the stabilizer, tocophenols as antioxidizing materials such as p-methoxyphenol, for example, glycerol esters as surface-active agents such as glycerol monoacetate and glycerol monooleate, for example, and a fatty acid ester of alcolbin [transliteration] acid can be used.

[0014]

As examples of the dissolution or dispersion in a non-water-soluble solvent, benzene and toluene are dissolved or dispersed in aromatic hydrocarbons, methylethyl ketone in aliphatic hydrocarbons, ethyl acetate in esters, and n-butanol in alcohols. As additional components, kaolin, synthetic silica, and calcium carbonate, for example, as water-absorbing powders, and nonionic surface-active agents, anionic surface-active agents, cationic surface-active agents, and polyethylene glycols, for example, as lubricants, can be used.

[0015]

In the protein-detecting ink composite, a reagent composite, consisting of an indicator which indicates protein, a pH buffer, a protein-absorbing ion exchanger, a binder, and a water-absorbing powder, is dissolved or dispersed in a solvent. When the protein in the body fluid that is being tested comes into contact with the indicator which indicates protein and is maintained at a pH on the acidic side, such as tetrabromo blue, for example, this indicator and the protein form a compound,

which changes the color from yellow, which is the acidic color, to blue, which is the basic color, and the level of this discoloration is in accordance with the amount of protein which is present in the body fluid that is being tested. The protein-absorbing ion exchanger is a weak acid cationic ion exchanger having carboxyl radicals of a hydrophilic ion exchanger, such as styrene and acryl type synthetic resins, for example. A maleic anhydride copolymer, which is esterified with an alcohol, is used as the binder.

[0016]

As the maleic anhydride copolymer resin, esterified products, in which methylvinyl ether, isobutylene, or styrene reacts with a maleic anhydride copolymer and alcohol, are suitably used. Maleic anhydride copolymers include: (1) synthetic resins, such as a polyester resin, alkyd resin, polyurethane resin, polystyrene resin, acryl resin, vinyl chloride resin, vinyl chloride copolymer resin, polyvinyl butyral resin, polyvinyl alcohol resin, and maleic anhydride copolymer resin, for example; (2) cellulose derivatives, such as methylcellulose, ethylcellulose, hydroxyethylcellulose, and carboxymethylcellulose, for example; and (3) natural high polymers, such as starches, polysaccharides, gelatin, casein, and sodium alginate, for example.

[0017]

As the water-absorbing powder, kaolin, synthetic silica, glass, cellulose blocks, microcrystal cellulose, an ion exchange

cellulose, an ion exchange resin, calcium carbonate, magnesium carbonate, and aluminum silicate, for example, are used. As the solvent, non-water soluble solvents including aromatic hydrocarbons, aliphatic hydrocarbons, esters, and alcohols, for example, are used. As additional components, nonionic surface active agents, anionic surface active agents, cationic surface active agents, and polyethylene glycols, for example, are suitable as a lubricant, and as a shape-retaining agent, water-expanding resins that have carboxyl radicals are suitably used.

[0018]

As the indicator which indicates protein, tetrabromo phenol blue and tetrabromothymol blue, for example, are suitably used. The pH buffer is used for maintaining the pH value near the pH at which the indicator which indicates the aforementioned protein has a color change, and the combination of citric acid and sodium citrate is suitable for maintaining the reagent composite at pH 3-4, for example.

[0019]

In the pH-detecting ink composite, a reagent composite, consisting of an indicator, a quaternary ammonium salt or amine salt, a binder, and a water-absorbing powder, is dissolved or dispersed in a solvent. The pH of the body fluid that is being tested is measured by identifying the color tone of the indicator through a satisfactory combination of several kinds of indicators that change the color or intensity according to the pH. Any indicator which changes color or intensity in accordance

with the concentration of the hydrogen ions in the body fluid that is being tested can be used. Also, a pH region over a wide range can be measured by selecting and combining a number of indicators. For example, the pH can be identified within a range of pH 5-9 by using a combination of methyl red and bromothymol blue as the pH indicator.

[0020]

Quaternary ammonium salt or amine salt. The discoloration over time of the color which is first displayed can be greatly controlled by mixing an appropriate amount of quaternary ammonium salt, in the reagent composite, and a bright color can also be obtained. As the quaternary ammonium salt, alkyltrimethyl ammonium salt, alkyldimethylbenzene ammonium salt, and saponin type ammonium salt, for example, can be used. From these, alkyldimethylbenzene ammonium salt is most suitable. Also, cationic surface active agents, such as primary amine salts, secondary amine salts, for example, or polyethylene glycol, can be used.

[0021]

As the binder, natural high polymer compounds including: sweet potato starch, potato starch, devil's tongue flour, glue plant, gelatin, sodium arginine, hibiscus, Tongaro [transliteration] rubber, gum Arabic, glue, levan, gelatin, casein, and collagen, for example; cellulose derivatives including methylcellulose, hydroxypropylcellulose, hydroxyethylcellulose, and carboxymethylcellulose, for example;

semi-synthetic hydrophilic large polymer compounds such as derivatives of carboxymethyl starch and dialdehyde starch, for example; and synthetic high polymer compounds, such as polyvinyl alcohol, polyacryl amide, polyvinyl pyrrolidone, and their copolymers, sodium polyacrylate, and polyethylene oxide, for example, are used.

[0022]

As the water-soluble high polymer compound which forms a film, cellulose resin such as nitrocellulose, cellulose acetate, and ethylcellulose, for example, polyester resin, alkyd resin, polyurethane resin, epoxy resin, acrylic resin, vinyl chloride resin, and emulsions, for example, are used. From these, urethane resin and polyvinyl butyral are most suitably used because they do not disturb the coloration reaction of the pH indicator.

[0023]

The water-absorbing powder, when mixed into the reagent composite, promotes the contact between the body fluid that is being tested with the pH indicator, and promotes the coloration reaction with this indicator. As such a water-absorbing powder, those that display extreme acidity or alkalinity when coming into contact with water are not suitable, and kaolin, synthetic silica, glass, cellulose blocks, calcium carbonate, and aluminum silicate, for example, are used.

[0024]

As the solvent, those that can uniformly and stably dissolve or disperse the reagent, particularly the binder, are suitable. Concretely, non-water solvents, such as aromatic hydrocarbons, aliphatic hydrocarbons, esters, and alcohols; for example, water, or their mixtures are used. In addition to each of the aforementioned components, a small amount of a wetting agent, such as nonionic surface-active agents, anionic surface active agents, cationic surface-active agents, and polyethylene glycols, for example, can be mixed into the pH detecting reagent composite. As basic materials, ammonium hydroxide, alkali metal hydroxides, and alkaline earth metal hydroxides, for example, are used.

[0025]

In the occult blood detecting ink composite, a reagent composite, consisting of an oxidation indicator, an organic peroxide, a binder, and a surface-active agent and a background pigment if necessary, is dissolved or dispersed in a non-water solvent. When occult blood is present in the body fluid, this occult blood forms a compound with an organic peroxide, such as cumene hydroperoxide, for example, generates nascent oxygen, this oxygen immediately reacts with an oxidation indicator, such as orthotridine and benzidines, for example, and displays the color of this indicator. As the organic peroxide, cumene hydroperoxide, for example, is used.

[0026]

As the binder, (1) synthetic resins such as polyester resin, alkyd resin, polyurethane resin, polystyrene resin, acryl resin, epoxy resin, vinyl chloride resin, vinyl chloride copolymer resin, polyvinyl butyral resin, and polyvinyl alcohol resin, for example, (2) cellulose derivatives such as methylcellulose, ethylcellulose, hydroxyethylcellulose, and carboxymethylcellulose, for example, and (3) natural high polymers such as starches, polysaccharides, gelatin, casein, and sodium alginate, for example, and combinations of the above can be used.

[0027]

As additional components, water-absorbing powders such as kaolin, synthetic silica, glass, cellulose blocks, microcrystal cellulose, an ion exchange cellulose, calcium carbonate, magnesium carbonate, and aluminum silicate, for example, are used. As the solvent, those that can uniformly and stably dissolve or disperse reagents, particularly the binder, are suitable. Concretely, non-water solvents, such as aromatic hydrocarbons, aliphatic hydrocarbons, esters, and alcohols, for example, water, or their mixtures are used. As the wetting agent, nonionic surface-active agents, anionic surface active agents, cationic surface-active agents, and polyethylene glycols, for example, are used. Also, a background pigment, such as oil yellow, for example, may be added so that the color tone of the indicator can be easily viewed.

[0028]

In the urobilinogen-detecting ink composite, a reagent composite, consisting of a pigment precursor, which displays color when reacting with urobilinogen, a strong acid buffer, a binder, and a water-absorbing powder, is dissolved or dispersed in a non-water soluble solvent. When urobilinogen is present within the body fluid, urobilinogen binds with a pigment precursor, such as p-dimethylaminobenzaldehyde, for example, and displays color, and whether or not urobilinogen is present in the body fluid can be identified by detecting the presence as well as the level of this coloration. As the pigment precursor, which reacts with urobilinogen and displays color, p-dimethylaminobenzaldehyde, p-diethylaminobenzaldehyde, aromatic diazonium salts, and p-methoxybenzenediazoniumboratetetrafluoride, for example, are used.

[0029]

Because the reaction between urobilinogen and the aforementioned pigment precursor proceeds well in an acid region, a strong acid buffer is mixed into the reagent composite. As the strong acid buffer, metaphosphoric acid, sulfosalicylic acid, hexamine acid, and nitric acid, for example, are used. As the binder, (1) synthetic resins such as polyester resin, alkyd resin, polyurethane resin, polystyrene resin, acrylic resin, epoxy resin, vinyl chloride resin, polyvinyl alcohol resin, and maleic anhydride type copolymers, for example, (2) cellulose derivatives such as methylcellulose,

ethylcellulose, hydroxyethylcellulose, and carboxymethylcellulose, for example, and (3) natural high polymers such as starches, polysaccharides, gelatin, casein, and sodium alginate, for example, and mixtures of the above can be used.

[0030]

Additional components include water-absorbing powders such as kaolin, synthetic silica, glass, cellulose blocks, microcrystal cellulose, an ion exchange cellulose, an ion exchange resin, calcium carbonate, magnesium carbonate, and aluminum silicate, for example. As the solvent, those that can uniformly and stably dissolve or disperse the reagents, particularly the binder, are suitable. Concretely, non-water solvents, such as aromatic hydrocarbons, aliphatic hydrocarbons, esters, and alcohols, for example, water, or their mixtures are used. As the wetting agent, nonionic surface-active agents, anionic surface active agents, cationic surface-active agents, and polyethylene glycols, for example, are used.

[0031]

Figure 2 shows an oblique diagram of a towel (5) in Application Example 2 of this invention. Figure 3 shows an oblique diagram of litter for pets (6) in Application Example 3 of this invention. Figure 4 shows an oblique diagram of a napkin (7) for animals in Application Example 4 of this invention. Figure 5 shows an oblique diagram of a napkin (8) in Application Example 5 of this invention. Figure 6 is a top view diagram of a

toilet sheet cover in Application Example 6 of this invention. When urine, for example, comes into contact with the towel (5) in Figure 2 and the napkin (8) in Figure 5, the ink composite in that area changes color. Also, the ink, which changes from colorless to color, is impregnated into the litter sand for pets (6) in Figure 3, and only that area comes into contact with the urine of a pet changes color, and only that portion need be discarded.

[0032]

Also, when the ink is impregnated into the pattern (7a) of the napkin for animals (7) in Figure 4, and urine comes into contact with it, only this pattern (7a) changes color. As shown in Figure 6, a cut-out section (12) is provided to the toilet sheet cover so that it can be cut out near the center of the sheet (9) by a cutting line (13) of the necessary shape. The cutting line (13) has sections of broken lines (14) and connected sections (11), but this structure is not particularly restrictive.

[0033]

This toilet sheet cover is mounted over a western-style toilet, and the cut-out section (12) is cut as the user urinates. The necessary ink is at least impregnated into the cut out section (12). Or, it may be impregnated in the surrounding section (10) of the cut section (12). Without being limited to the application examples described above, [this invention] can

be applied to daily necessaries including tissue paper, diapers, labels, toilet paper, and bags, for example.

Effect of the invention

As explained above, this invention has the effect of allowing easy, convenient, and early detection of human and animal diseases.

Brief description of the figures

Figure 1 shows an oblique diagram of Application Example 1 of this invention.

Figure 2 shows an oblique diagram of Application Example 2 of this invention.

Figure 3 shows an oblique diagram of Application Example 3 of this invention.

Figure 4 shows an oblique diagram of Application Example 4 of this invention.

Figure 5 shows an oblique diagram of Application Example 5 of this invention.

Figure 6 shows an oblique diagram of Application Example 6 of this invention.

Explanation of the symbols

1, 3. sheets, 2. paper, 4. synthetic resin film, 5. towel, 6. litter for animals, 7. napkin for animals, and 8. napkin.

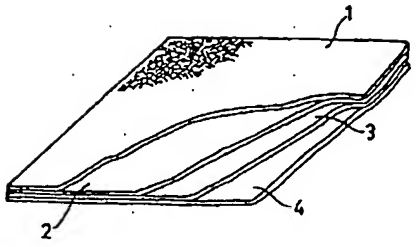

Figure 1

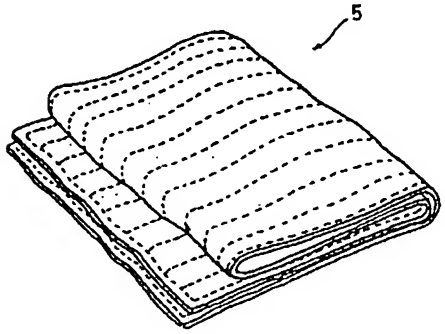

Figure 2

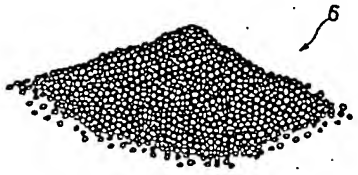

Figure 3

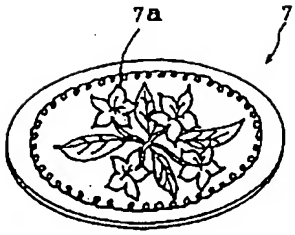

Figure 4

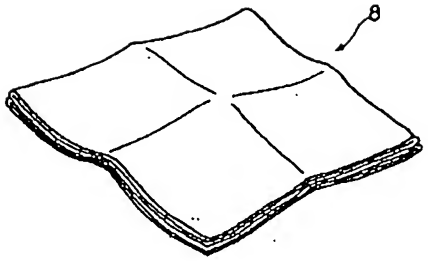

Figure 5

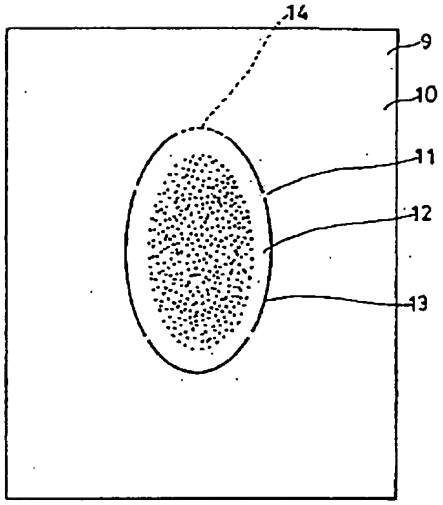

Figure 6